Noncontact Dipole Density Mapping of Complex Atypical Flutters Using an Ultrasound-Electrode Array Catheter: Comparison to Conventional Contact Mapping

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**Results**

**Patient Demographics**

- N: 11 subjects
- Prior ablation: 64%
- Hypertension: 91%
- Gender: 64% Male
- Dilated CM: 27%
- Prior CVA: 9%
- Vascular Disease: 9%

**Procedural Rhythms**

- Atypical Flutter: 100% (11/11)
- Atrial Fibrillation: 91% (10/11)

**Mapping Results**

- Good correlation between mapping systems

**Conclusions**

- In stable rhythm patterns, there was good agreement among all map types.
- In more complex, irregular rhythms, contact mapping was largely unsuccessful, whereas dipole density non-contact mapping successfully identified the pattern for atypical atrial flutters.

**Introduction**

Conventional contact mapping of atypical atrial flutter requires a high density of contact electrograms. Non-contact, global, dipole density mapping partly obviates the technical skill needed for high density contact mapping. Dipole density derives the local charge sources on the surface from intracavitary voltage, an approach that should minimize far-field effects. We assessed atypical flutter mapping using a novel ultrasound basket catheter able to perform dipole density non-contact mapping.

**Methods**

The AcQMap system (Acutus Medical Inc) employs a basket catheter [25 mm diameter, 48 ultrasound transducers (m-mode), 48 engineered electrodes] that rapidly acquires i) endocardial ultrasound distances to render 3D left atrial anatomy, and ii) bio-potential data for rapid far-field mapping. An inverse solution is used to calculate the dipole density from the voltages measured on the basket. The calculated data is spatially and temporally applied to the final processed surface anatomy as either a depolarization or propagation history map. In a depolarization map the red region depicts the negative phase of dipole density and when animated is associated with propagation of depolarization. In the propagation history map, red represents the leading edge of the activation wave front with the trailing color bands showing earlier locations of the wave front.

Dipole density and voltage non-contact maps were compared to available conventional voltage contact maps for correlation and ability to map each flutter activation pattern encountered.

**Disclosures**

- Vivek Reddy, MD: Acutus Medical: Stock Options
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